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Bracing and Taping Techniques and Patellofemoral Pain Syndrome

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Clinical Question: Is there an effective bracing or taping technique for treating patellofemoral pain?

Data Sources: The authors searched the Cochrane Musculoskeletal Injuries Group specialized register (December 2001), the Cochrane Controlled Trials Register (2000, issue 2), MEDLINE (January 1966 to March 2000), EMBASE (January 1988 to March 2000), CINAHL (January 1982 to March 2000), and PEDro (up to March 2000) without language limitations. They also contacted relevant orthotic companies and searched the included reference lists of the retrieved articles. The search terms for MEDLINE were *anterior knee pain*, *arthralgia*, *knee joint*, *patella*, and *patellofemoral pain.* The search terms for EMBASE were *brace*, *chondropathy*, *dynamic splint*, *knee*, *orthosis*, *orthotics*, *patella*, *patella chondromalacia*, *patellofemoral joint*, *randomized control trial*, and *strap.* The search terms for CINAHL were *anterior knee pain*, *brace*, *orthot*, *orthos*, *randomi*, *strap*, *tape*, *patell*, and *patellofemoral.* In PEDro, the subsequent composite of search terms was therapy: *manipulation, massage, mobilization, orthoses, splinting, stretching, strength training, taping*; subdiscipline: *musculoskeletal, orthopaedics, sports*; method: *clinical trial*; problem: *muscle weakness, pain, reduced joint compliance*; body part: *foot or ankle*, *lower leg or knee*.

Study Selection: All randomized and quasi-randomized trials comparing the effectiveness of knee or foot orthotics for treatment of patellofemoral pain syndrome were included. Any trials that described the use of orthotic devices in conjunction with operative treatment were excluded from this review. Using these inclusion criteria, 2 reviewers independently assessed the potentially eligible studies and resolved any disagreements through conversation and negotiation by a third reviewer. Although the authors mentioned that the review's purpose was to assess knee and foot orthoses, none of the included studies assessed foot orthoses. Therefore, all trials that examined foot orthotics were excluded.

Data Extraction: Using a preset extraction form, 2 reviewers independently entered data into a review manager software program (RevMan 2000; The Cochrane Collaboration, Oxford, United Kingdom). This program was produced by the Cochrane Collaboration to support systematic reviews. Any further information needed regarding methods and data was requested from the authors. Because of heterogeneity of the study population, interventions, and follow-up periods, statistical pooling was not conducted. In place of statistical pooling, the strength of scientific evidence was graded based on a scale of A through D, with A being the strongest evidence-based research and D being the weakest evidence-based research.

Main Results: The search strategy identified 15 trials, of which only 5 trials met all the inclusion criteria and had enough data to be considered for pooling. The 5 trials involved 362 participants who were assessed for pain, functional improvement, isokinetic muscular strength, motivation, subjective success, worst pain, usual pain, subjective clinical pain, and patellofemoral congruence angle. Of the 5 studies included in the review, only the following statistically significant differences were found. The Protonics orthosis significantly decreased pain and improved function based on the Kujala score versus no treatment. A home exercise program with McConnell taping and biofeedback decreased pain and improved function based on the Functional Index Questionnaire versus home exercise and monitored therapy. In addition, the Protonics orthosis versus no treatment resulted in a patellofemoral congruence angle change; McConnell taping versus Couman bandage improved satisfaction with applied therapy and isokinetic muscle strength at 300°/s of knee flexion. No other findings included in the review studies were statistically significant. The included studies were inadequate in their methodologic quality and incomplete in their research-based evidence, which was obtained by their investigators.

Conclusions: According to the systematic review by D'hondt et al, the strength of retrieved research-based evidence of effectiveness of orthotic devices in the treatment of patellofemoral pain syndrome was graded C. This grade was appropriate because all trials had low-quality methodologic evidence to support or reject the effectiveness of orthotics and taping techniques in reducing pain. Although very little scientific evidence is available regarding the use of orthotics and taping techniques, D'hondt et al identified trends in orthotics and taping techniques that should be considered in clinical practice. A comprehensive exercise and stretching program with tape application was more effective in decreasing worst pain and usual pain and increasing functional improvement. This finding indicates that patellofemoral pain syndrome is best treated by using more than 1 intervention. In addition, no difference was apparent in pain outcomes between McConnell taping technique and Couman bandage: neither technique resolved pain. The Protonics orthosis actively affected patellar tracking by reducing internal rotation of the femur and compression on the lateral aspect of the patella. As a result, the Protonics orthosis reduced pain compared with no treatment. In contrast, the Couman bandage is used only to guide the patellar tracking pattern and massage the structures around the patella during motion. Yet a home exercise program with the addition of a stretching program and McConnell taping decreased pain and increased function, which may suggest that a combination of treatment approaches is needed to effectively treat the condition, as found in previous studies.

Key Words: knee orthotics, knee pain, rehabilitation

COMMENTARY

Patellofemoral pain syndrome (PFPS) is a frequent complaint of active adults, and many patients try to find a conservative treatment to reduce this pain. One conservative treatment is orthotic devices in the form of knee braces, knee straps, taping, active training devices, knee sleeves, or shoe orthotics. The research to date has not identified an optimal strategy to relieve this pain.

Many patients have successful results from conservative management techniques. Treatments that are normally used for this syndrome, in combination or alone, include patellar taping, bracing, orthotics, home exercise programs, supervised exercise programs, vastus medialis oblique strengthening, and biofeedback.[1–4] In sports such as basketball and track and field, where PFPS can result from excessive running, knowing the most effective treatment to resolve the pain can help the athletic trainer return the athlete to play with more strength and better biomechanics.

When an athlete reports patellofemoral pain, the athletic trainer should perform an overall lower extremity evaluation. Then the most effective conservative treatment, which may include an exercise program and taping or bracing, should be integrated into the athlete's daily routine. Based on the information in this systematic review, orthotic devices or an exercise program in combination with tape and biofeedback decreased pain significantly compared with no treatment at all. This result has been validated in more recent studies.[1–4]

This review[5] provided information regarding a wide variety of conservative treatment strategies for treating PFPS. Based on visual analog scale scores, patellar taping (1.073 ± 0.176) effectively reduced pain versus not taping (1.453 ± 0.201)[2]; patellar bracing was also effective.[4]

However, this review is limited in several ways. First, of the 15 trials found, only 5 met the methodologic criteria for inclusion in this systematic review. In addition, all randomized and quasi-randomized trials included were of low methodologic quality based on the Cochrane Musculoskeletal Review Group modified assessment tool used by the reviewers. The results of current trials must be interpreted with caution. A higher standard of reporting trials should be upheld to allow for increased application in practice.[6]

Second, the duration of the follow-up periods did not provide adequate time to identify any clinically applicable changes. Therefore, good evidence-based recommendations for optimal treatments of PFPS are necessary in future studies. Also, future investigators should use more effective outcome measures to determine the benefits of various approaches to treating PFPS. In addition, future studies need to focus on the short-term and long-term effects of various treatment strategies for PFPS.

Athletic trainers frequently see PFPS in athletic training rooms. It is the athletic trainer's responsibility to improve the athlete's pain and function to allow him or her to compete at an optimum level. The results of this review are a stepping stone in finding the most effective treatment, but many unanswered questions remain that need to be addressed by future studies. This review also indicates that orthotics alone cannot fix or treat PFPS. In clinical practice, athletic trainers may want to base their clinical practice on high-quality evidence-based studies to provide the best treatment for PFPS to their athletes or patients. Athletic trainers who incorporate an exercise program into the PFPS treatment protocol may also want to focus on improving quadriceps strength and function. To determine the effectiveness of treatment, the selected treatment chosen for PFPS should be incorporated into clinical practice for more than 8 weeks before a follow-up evaluation is performed; a recent study[3] showed no significant difference in PFPS after 6 weeks. With more information, athletic trainers can better treat their athletes and improve outcomes and performance-based measures.

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